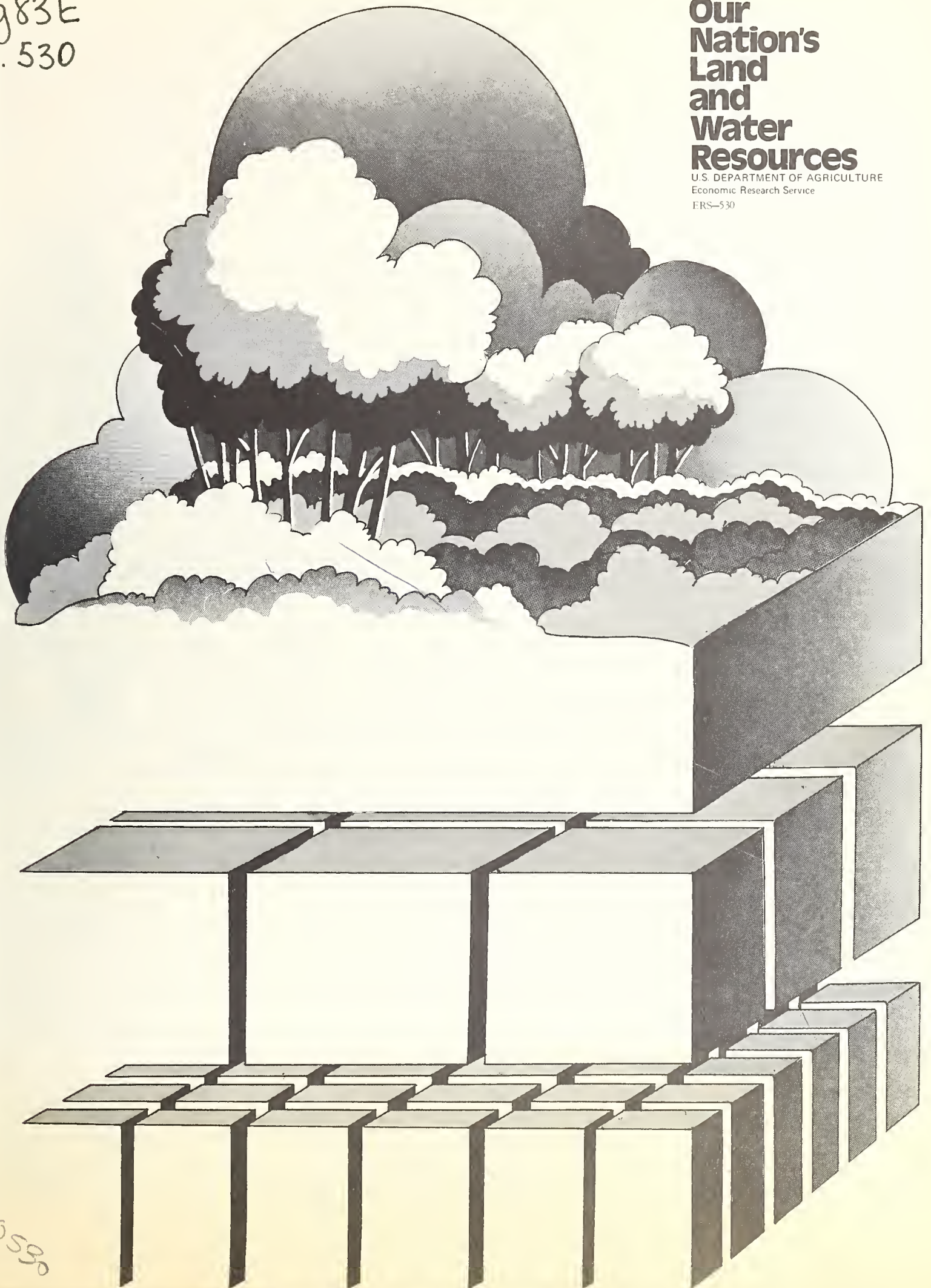


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Our Nation's Land and Water Resources

U.S. DEPARTMENT OF AGRICULTURE
Economic Research Service
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PREFACE

The use of the Nation's land and water resources is receiving widespread attention. Misuse of our natural resources could have long-term adverse effects on the Nation's economy and the quality of the environment.

The Federal Government, and State and local governments, have a continuing responsibility to assess the adequacy of our natural resources to meet future needs and to improve the quality of the environment. The Economic Research Service provides socio-economic information on a broad range of subjects relating to rural land and water resources, and projects future requirements for these resources. This series of articles appeared in The Farm Index issues dated December 1972 - April 1973. They are assembled here for separate release by the Natural Resource Economics Division. They provide general information on the use and ownership of our land and water resources, and project future supply and demand of these resources for different uses.

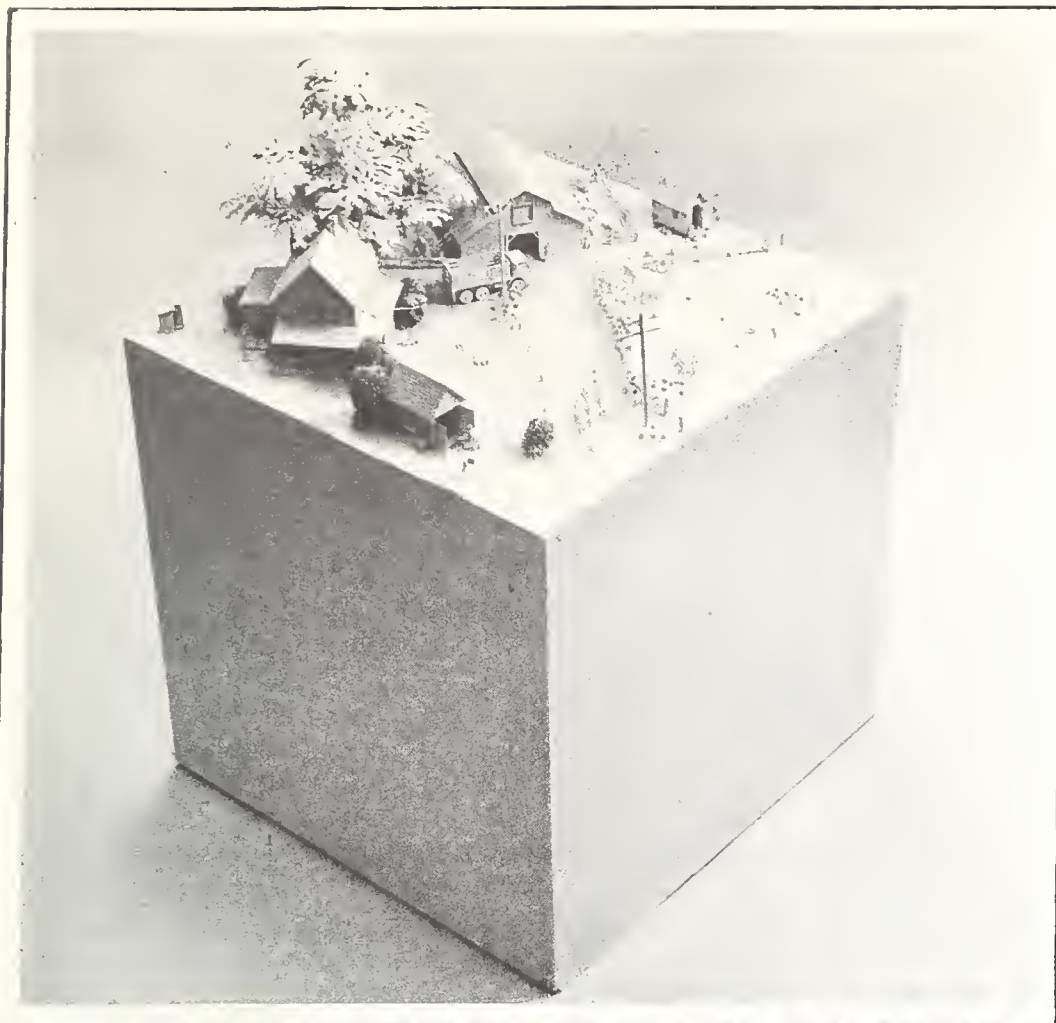
These articles were drawn from papers prepared by the following staff members of the Natural Resource Economics Division: William D. Anderson, Robert F. Boxley, Harold Ellis, H. Thomas Frey, Joel Frisch, John F. Fritschen, Orville Krause, Norman Landgren, Dudley Mattson, Howard A. Osborn, Robert C. Otte, George C. Pavelis, John Putnam, Larry Schluntz, and Gene Wunderlich. They were prepared by Farm Index staff editor Diana Morse.

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billion acres, agricultural uses continue to be the dominant use of the land and are still expected to account for more than half the land area in 2000.

Looking at the national picture permits one to gloss over some serious land use problems. Many people feel real concern about the loss of good cropland to cities, or for roads. Strip mining lays waste to large areas. Drainage of wetland destroys wildlife habitat. Just how critical is the supply of land for all the uses we make of it?

Productivity upswing. Actually, we need less land than ever for food and fiber because of greatly increased production per acre. The amount of cropland used decreased by more than a tenth from 1950 to 1970 as production per acre increased by half, outpacing population's increase of a third.

Overall, the way land is used in the U.S. has remained virtually unchanged since 1950. Cropland takes about a fifth of the land, grassland pasture and range about a fourth, forest land about a third, and wasteland an eighth.

Urban areas double. Although urban areas claim twice as much land as they did in 1950, they still occupy only 1½ percent of total land area. Despite expanded highway and airport facilities, land used for transportation still takes only 1 percent of the land. Many new roads were built on existing rights of way and some roads have been abandoned.

A significant change since 1950 has been the 20-million acre increase in land used for recreation and wildlife areas, now occupying 4 percent of our land. Much of this increase was in Alaska. For the most part, this increase in recreation and wildlife lands resulted from a change in classification, and not in land cover.

The proportion of land in various major uses is different for the 48 contiguous States than for the entire U.S. Across the 48 States there's been no appreciable overall change in land use in the past 20 years—crop-

may never again be used for agriculture.

Another 2 million acres on the average have gone out of rural land annually since 1959 into what are considered "reversible" uses for recreation and wildlife areas.

The average American may begin to feel he's in the path of a concrete flow from some urban volcano. Will there be any land left for agriculture?

Natural resources experts in ERS, in a comprehensive land and water study, firmly spell out that we're not in a bind for agricultural land, nor are we expected to be by the year 2000. Of the Nation's more than 2

We have better than 2 billion acres of land in the U.S., most of it agricultural. An ERS study takes note of how it's being used, how it's changing . . . and how it may be used by the year 2000.

Each year for the past 10 years, like giant hens, cities have pulled nearly three-quarters of a million acres of countryside under their wings.

Roads and airports covered another 130,000 acres of rural land, and reservoirs engulfed still another 300,000 acres annually.

Together, they gathered up more than a million acres each year that

land still totals a fourth of the land; forest land, a third; grassland pasture and range, a third, and wasteland, 3 percent. Urban land has doubled, amounting to nearly 2 percent of total land area, and transportation land remains less than 1½ percent of total acreage.

The predominant use of land varies greatly. In the Corn Belt and Northern Plains, more than half of the land is cropland. In the Southern Plains and Mountain States, pasture and rangeland predominate. In the Northeast, forest land is the major use of the land, as it is in the Appalachian, Southeast, and Delta States and the Pacific Coast north of San Francisco.

Biggest land user. The more than 1 billion acres—half the Nation's land—that is in farms is used mostly for crops and livestock. Farmers use an additional 300 million acres of non-farm land for grazing. In total, agricultural production takes up 57 percent of the U.S. land area.

Another third of the Nation is in forest land, including some used for grazing.

Land used for crops, pasture, and forests total 1,811 million acres—80 percent of the total U.S. land area of 2,264 million acres.

Despite the stability of land use proportions, there have been significant shifts and changes within land use categories in the past 20 years.

More idle cropland. Although cropland continues to take a quarter of the 48 States as it did in 1950, acreage actually used for crops has been decreasing at an average of 2 million acres a year. Idle cropland, meanwhile, has increased about a million acres a year. Thus the net decrease is about a million acres a year. The increase in idle cropland, in compliance with Federal supply management programs, resulted from a 50-percent increase in cropland productivity since 1950. This great productivity increase stems from more efficient farm organization, improved machinery, increased use of agricultural chemicals such as fertilizers and pesticides, additives

to livestock rations, improved crop and livestock species and management, more irrigation, and regional shifts in production.

While total cropland has been declining a little each year, the trend by region is varied—some areas actually have an uptrend in cropland while others show significant abandonment.

New cropland has come almost entirely from a few specific areas: Florida, where land was reclaimed through drainage and irrigation projects . . . the Delta States, where land was reclaimed through clearing and drainage . . . the Texas High Plains, California, and Washington, where irrigation was expanded . . . northern Montana, where improved dryland farming techniques were undertaken . . . and the Corn Belt

through various farm-oriented techniques such as drainage, clearing, contouring, and leveling.

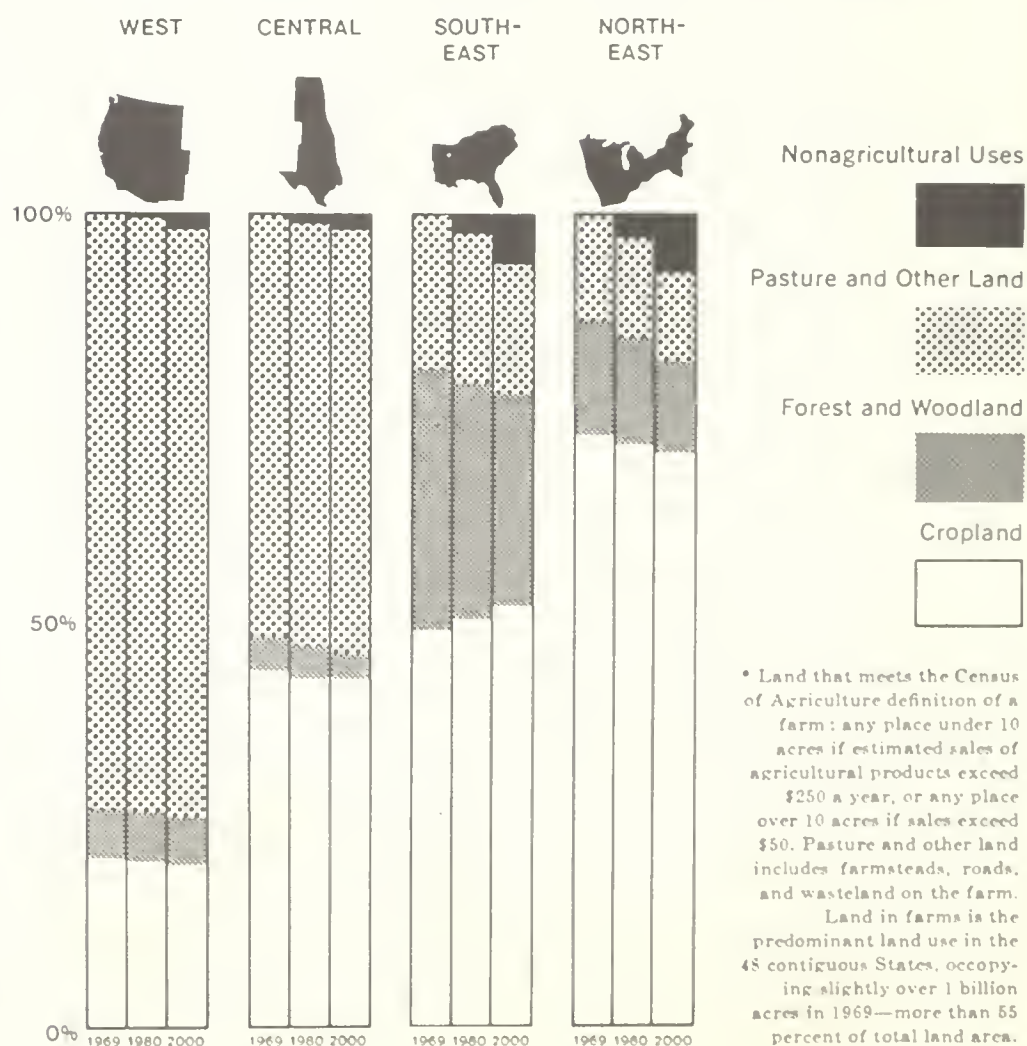
Cropland was abandoned on a large scale in States south and east of the Corn Belt except the Delta and southern Florida.

East of the Mississippi, land was abandoned because of low soil fertility and terrain not adaptable to efficient use of modern machinery. Many fields were small, rough, and isolated.

Less pasture and range. There's been a 13-percent decrease over the past 2 decades in the land on which livestock graze. Much of this land was woodland and low in productivity for grazing.

Altogether, pasture and range land occupy 39 percent of the land in the 48 States. Total acreage of

TODAY'S FARMLAND—HOW IT MAY BE USED BY YEAR 2000 *



grassland pasture and range has remained virtually unchanged since 1950 in contrast to woodland grazed.

Forest land. Total land in forest, at 754 million acres, has accounted for a third of the land area in the U.S. for many years. About a sixth of this land is in Alaska, where very little is harvested for wood products.

Of the 633 million acres in the 48 States, almost 80 percent is commercially productive.

About two-thirds of the total forest land and three-fourths of the productive forest land lies east of the Plains States. Practically all of this eastern forest land is classed as producing 20 or more cubic feet of useful wood growth per acre per year.

The greater share of current net wood growth is in the East, where growth exceeds harvest and losses by a sizable margin—despite the increased harvest for pulp and plywood. However, only a third of the tree volume is softwood, while the harvest is 63 percent softwood.

Nonagricultural land. Of the 20 percent of the Nation that is not cropland, grassland pasture and range, or forest, two-thirds is essentially wasteland. This includes deserts, swamps, bare rock, tundra—land that would have low value generally for agriculture or any other purpose except mineral extraction.

What's left is 178 million acres, or about 8 percent of total land area. This is the land with which the vast majority of Americans are most familiar. A third of it is urban or transportation land. Two-thirds of it is mostly parks, wildlife areas, and public facilities such as military proving grounds.

NOW FOR A LOOK AHEAD. Analyzing trends in population, production, and land use, and projecting changes to the year 2000, ERS concludes that agriculture should be able to meet the country's needs for food and fiber (excluding forestry products).

Total U.S. population is projected at 307.8 million for the year 2000, 50

percent over 1970 and more than double the population in 1950. Total real personal income is projected at \$2,551 billion—up from \$689 billion in 1970, and real per capita personal income, \$8,289—up from \$3,388 in 1970.

Under these assumptions, the domestic use of farm products is expected to rise 55 percent in the next 30 years, allowing for the projected population increase plus a small gain in per capita food consumption.

By 2000. With land development following recent trends, ERS projects that by the year 2000 there will be a 3-percent decrease in land in farms from the 1969 figure.

Of the nearly 34 million acres going out of farming, 22 million would be for urban expansion, including highways and airports. This would have an insignificant effect on land available for agricultural production nationally, but could have a major impact around the current growth centers.

Another 7 million acres are projected to go from agricultural uses to recreation and wildlife areas. The increase would mean some reduction in farmland where land is acquired solely for recreation. But where recreation is introduced as a multiple use of land, a decrease in the agricultural land base needn't necessarily follow.

The remaining 5 million acres projected to leave agricultural land in farms includes land for public facilities such as national defense, second home communities, and water control reservoirs, and for such other uses as strip mining. Although the projected land area for surface mining won't adversely affect agriculture nationally, it could have significant impact in local areas and on the water supply.

Energy crisis. In some areas, agriculture may experience adverse effects from the emerging energy crisis due to the development of coal and oil shale resources.

Nationwide, the projected 34 million acres going out of land in farms over the next 30 years won't have

much effect on production. While there is some shifting between uses, the net change amounts to 1½ million fewer acres of cropland, 13 million fewer acres of forest and woodland, and 19½ million fewer acres of pasture, range, and farmstead. Altogether, it's a little over 3 percent of the more than 1 billion acres of land in farms in 1969.

Great impact. But by region, it's apparent that there will be great impact in some areas, particularly the Northeast. In some parts, little agricultural land will remain.

Of the nearly 218 million acres in farms in the Northeast in 1969, 7 percent—nearly 16 million acres—are expected to shift to nonagricultural use by the year 2000. Cropland will decrease from nearly 159 million acres to 155 million; forest and woodland will decrease 6 million acres to 24½ million, and pasture, range, and other agricultural land will be reduced by almost 6 million acres, to 23 million.

Southeast shifts. The Southeast also shows considerable decrease—a net of nearly 9 million acres from the nearly 151 million acres in farms in 1969. However, cropland acreage is projected to increase by 4½ million acres, with additional clearing of forest land and draining of wetlands. Forest and woodland acreage is projected to decrease by nearly 9 million acres, and pasture, range, and other agricultural land, by nearly 5 million acres.

However, in the Central and Western States, agricultural land is projected to be reduced by only about 2 percent—or about 6½ million acres in each region—compared to the 6- and 7-percent decreases in the Southeast and Northeast.

By 2000, some 222 million acres out of the Nation's total acreage of more than 2 billion—or about a tenth of the land—is projected to be in nonagricultural use. Most of the additional land would be for urban and other built-up areas. (6)

[First in a series based on a land and water study by Natural Resource Economics Division, ERS.]

Water's Prime Consumer

There's a good reason why agriculture should be vitally concerned with this Nation's water resources: it's the biggest consumer.

Though it might come as a surprise to the city dweller, rural areas consume far more water than cities—a ratio of nearly 6 gallons for every 1 consumed in urban areas.

Water consumed—meaning it does not return to surface or ground water—accounts for about a fourth of the water withdrawn daily in the U.S.

Water withdrawals. As for withdrawals, agriculture used 121 billion gallons a day in 1970 and is projected to use 153 billion gallons by 2000. However, by then, steam-electric power plants, showing enormous growth, will be the greatest user.

What's agriculture using all this water for? Irrigation, mostly.

In a breakdown of water withdrawals as contrasted to actual consumption for 1970, ERS notes that rural areas took 38 percent of the 327-billion-gallon daily total, and 95 percent of this was for irrigation.

Cities a small user. Urban areas accounted for the remaining 62 percent of water withdrawals, but only 12 percent of this was for municipalities. Industry's self-supplied water accounted for 28 percent (of which nearly a fifth was from saline sources) and steam-electric power use accounted for 60 percent of all urban withdrawals.

Overall in 1970, the Nation withdrew 66 percent of its water from fresh surface sources, 24 percent from ground sources, and 10 percent from saline sources.

In general, we're not withdrawing anywhere near our total water resources. Precipitation for the 48 States amounts to an average of 30 inches a year, or about 4.2 trillion gallons a day. About 21 inches evaporates or is transpired from nonirrigated vegetation. Roughly two-fifths

of this is natural loss, but the remainder provides the moisture for four-fifths of our supply of food and fiber and nearly all of our forest products.

The remaining 9 inches is natural runoff. It averages 1.2 trillion gallons a day and can be considered the effective renewable supply. But there's also substantial accumulated groundwater on reserve, not all of which can be economically tapped. In addition, natural runoff in Alaska is 580 billion gallons a day, almost half that of the 48 States. Alaska's water resources represent the largest block of undeveloped water supply for the U.S.

Adequate supply. And so it's apparent that we have an adequate supply, nationally, to meet future withdrawal needs. By the year 2000, it's projected we'll be withdrawing for use 805 billion gallons a day, about two-thirds of our 1.2-trillion-gallon daily rate of runoff, and about 2½ times our 1970 average withdrawal. However, yearly, seasonal, and geographic variations in precipitation present serious problems in managing the use of the Nation's water supply.

Agriculture's role in all this is that it accounts for at least half—and in many cases nearly all—of the water consumption in 13 of the 17 water regions of the 48 States. The only places where agricultural consumption doesn't predominate are in the highly urbanized and industrialized regions of the North Atlantic, Great Lakes, and Ohio Basin.

Agriculture also accounts for almost all withdrawals in the Western States and Hawaii, with the exception of California where rural uses total 70 percent of withdrawals. In the East, urban withdrawals predominate.

Considering its current heavy role, agriculture will be the major consumer of water for many years to

come. Because of this, management and development of water resources in rural areas will continue to be important issues in public policy.

To speak of agricultural use of water, one is really speaking of irrigation, for it accounts for just about all of the water withdrawn for rural areas and for more than 80 percent of all water consumed in the U.S. in a year.

In 1970, the 44 million acres under irrigation used an average of about 3 feet of water for each acre irrigated. About 35 percent of this water came from the ground, and the rest, from surface sources.

Nearly all of the irrigation—90 percent—takes place in the 17 Western States, mainly in concentrated areas in the Texas Gulf and High Plains, southern Arizona, and California's Central Valley.

In the East, the irrigated acreage is concentrated in Florida, Arkansas, and Louisiana, with small operations scattered elsewhere through the cropland areas. In the humid areas, irrigation can prevent crop failures in drought years while increasing yields and improving product quality in average years. It is also used for both frost protection and for control of high temperatures on specialty crops.

Irrigated acreage increased for many years, by an annual average of 700,000 acres during 1939–1969. But more recently the rate of growth has dropped off.

In the East, although irrigated acreage is relatively small, it is nevertheless six times greater than in 1939. Two-thirds of the increase has taken place in Florida's fruit and vegetable area and the rice and soybean areas of Arkansas and Louisiana.

In the West, irrigated acreage doubled from 1939 to 1969, but with wide differences in growth among regions. The Northern and Southern

Plains now have more than a third of the total compared with a tenth in 1939. But in the Mountain and Pacific States, acreage has declined in recent years due to local ground and surface water shortages.

There's a considerable difference in the use of irrigated land across the country. In the West, more than a third is used for low-value hay and pasture and only 10 percent for fruit and vegetable crops.

In the East, only about 10 percent of the irrigated acreage is used for hay and pasture. Specialty crops account for more than half of the total—about equally divided among rice and fruits and vegetables.

In the years ahead, irrigation will continue to be the principal consumer. However, it will take a smaller proportion of total U.S. water withdrawals as other uses, es-

pecially steam-electric power, surge upward.

In contrast to the substantial improvement anticipated in recycling and other efficiencies in industrial uses, irrigation water use efficiency is expected to improve only modestly.

A number of trouble spots have already developed in the way of water quality and water shortages for agriculture, and water quality problems are particularly critical now in the water regions of the Lower Colorado, Rio Grande, North Atlantic, Ohio, Great Lakes, Tennessee, and Southeast, followed by the Upper and Lower Mississippi regions, the Great Basin and California.

Recent aerial photographs have shown that about half the irrigated land in the 17 Western States now has salinity problems. This has been

caused by not enough water being applied in irrigation to flush salts down through the root zone.

Supply shortage. The big water problem for the West, though, is one of supply.

In both the Lower Colorado and Rio Grande regions, use exceeds runoff supply considerably and water is used from upstream.

In the Texas High Plains, a heavily irrigated area of some 20 counties, groundwater sources are being depleted and some areas are reverting back to dryland farming.

In the Lower Colorado region, which has one of the highest population growth rates in the Nation, existing needs already overpower the dependable water supply that includes flows from the Upper Colorado region.

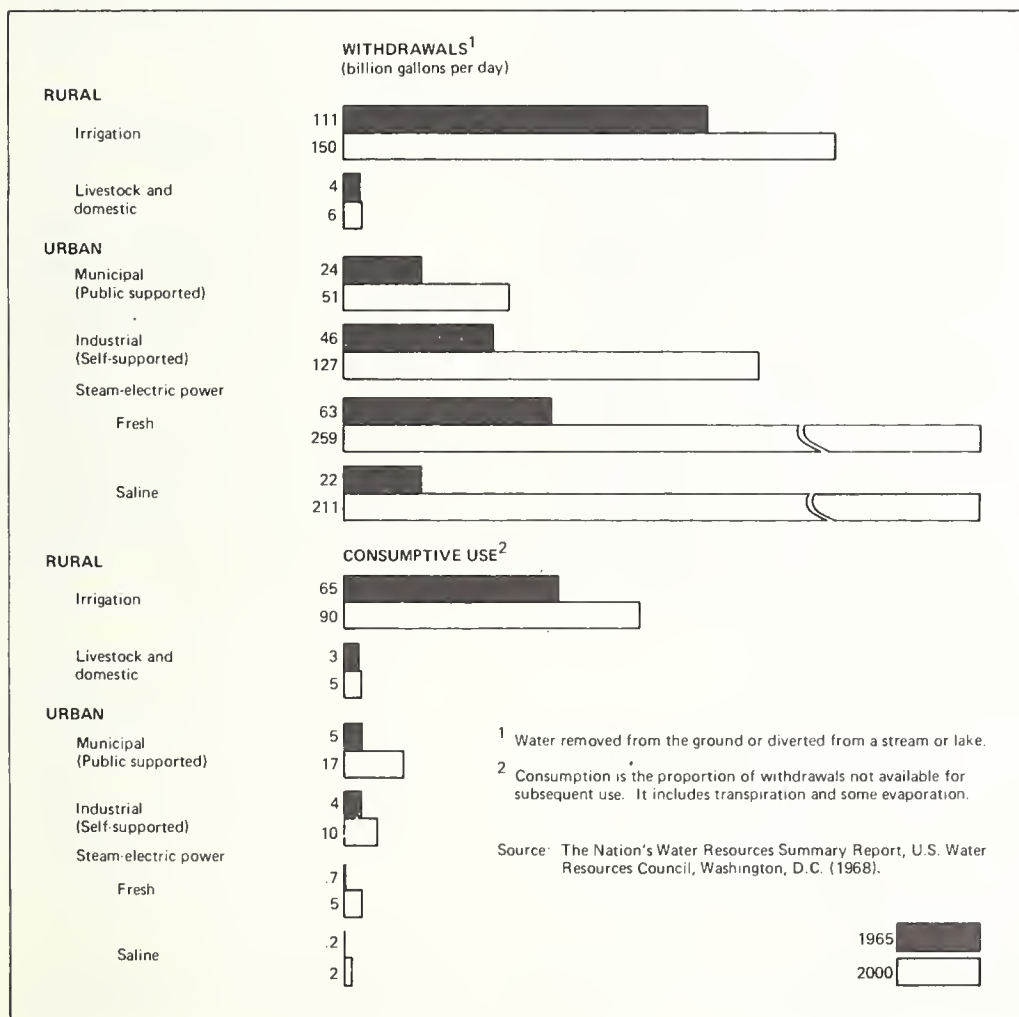
In contrast, the Lower Mississippi Region is second only to Alaska in terms of a low ratio of withdrawals to supply. It's a strategic area for development of the Nation's economy, and tremendous growth is expected with the enormous capacity of the Mississippi River to satisfy water requirements.

Farming shifts. This isn't the first time in recent years that water resources have had a profound effect on the location and productive capability of agricultural enterprises.

Cotton production, for instance, has shifted from the Southeastern States to the Mississippi Delta, the Texas High Plains, Arizona, and California. Irish potato production has moved from Maine and other Eastern States toward the Pacific Northwest because of the comparative advantage of irrigation in this region.

National policies regarding irrigation, drainage, and other agricultural water management measures are important factors in the development of adequate water supplies. Current policies envision more local-State-Federal cooperation in planning studies to assess the need for major storage and conveyance works to serve groups of communities. (6) [Second in a series.]

Water Uses: 1965 vs. the year 2000



LAND ISSUES

In the years to come, we can expect a lot of attention paid to how we should use our land. Here, ERS looks at some of the uses that will bid for rural acreage.

If you'd sit down with a pile of newspapers from around the country and sift through, looking at land issues, you'd probably be amazed at how widespread some of the "local" issues are.

An Ohioan would find strip mining isn't just a local situation . . . residents of New Jersey would realize wetlands development was far more extensive in other parts of the country . . . and we'd all realize that the demand for recreation land affects just about everyone.

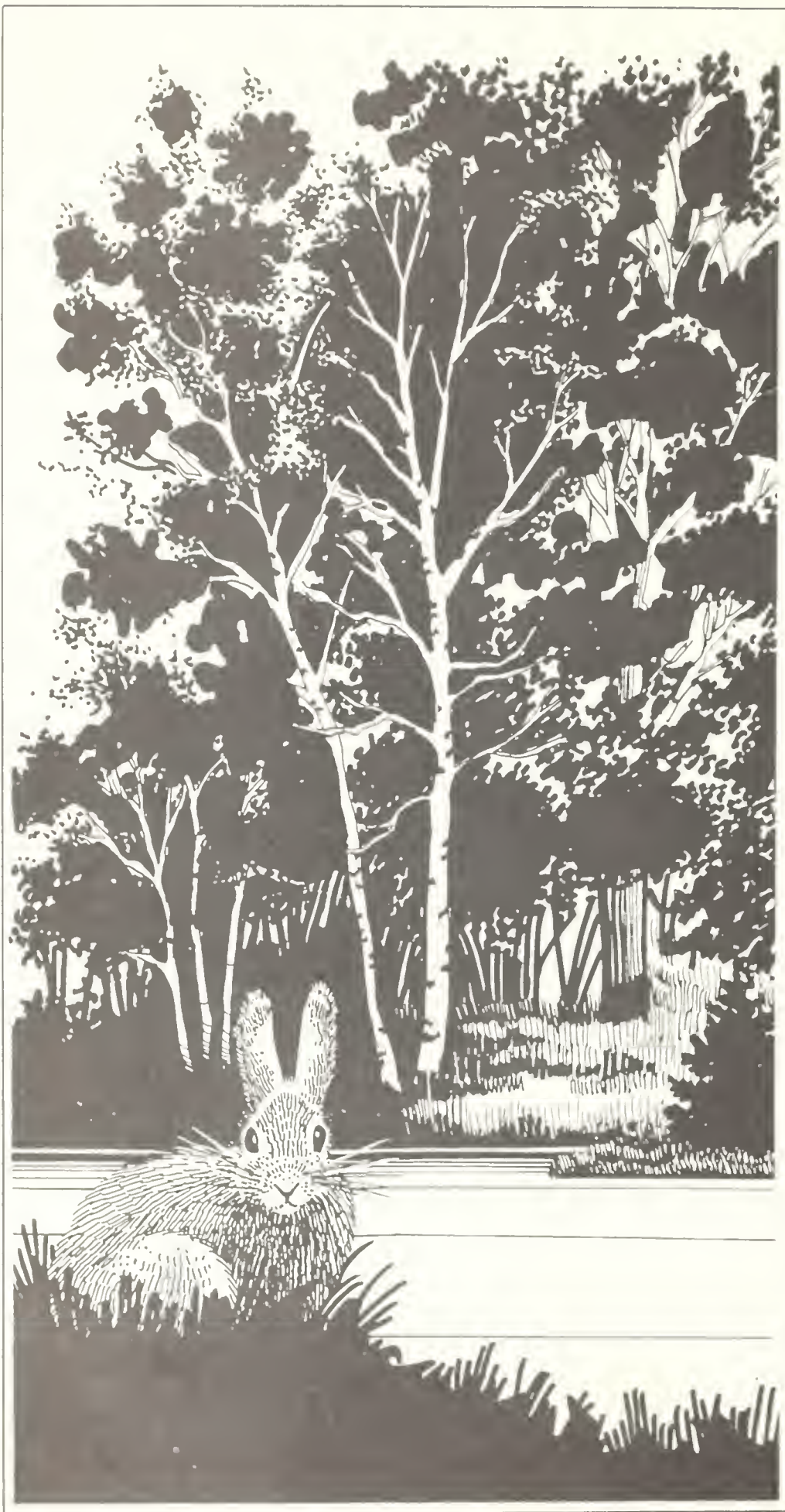
ERS focused on some of these current rural land problems in a recent study, providing perspective on a lot of issues in the news.

Let's look at four such issues: competing uses for rural land near cities; agricultural development of wetlands and woodlands; energy demands affecting rural land use; and the impact of outdoor recreation growth on rural lands.

RURAL LAND NEAR CITIES. Probably the most common news story on land issues gets down to the competing uses for rural land near cities. And there's a surprising amount of rural land in and around cities.

The 1970 Census shows that 70 percent of the population lives in what are called Standard Metropolitan Statistical Areas (SMSA's). An SMSA consists of an entire area in or around a city or community of 50,000 or more people and where activities form an integrated economic and social system.

All told, the SMSA's in 1970 encompassed about 13 percent of the total land area of the 48 contiguous



States—or about 253 million acres.

However, only about 10 percent of the SMSA land area was actually in urban uses in 1970. Most of the land is still in rural type uses. Much of it, though, is not readily accessible to many urban residents.

Land uses in the SMSA's varied widely by region in 1970. In the Appalachian, Southeast, and Delta States, more than half of the nonurban SMSA land was wooded, and nearly half in the Northeast. In the Lake and Pacific States, more than a third was wooded. In total, nearly one-third of the entire SMSA acreage was woodland in the 1970 Census.

In the Northern Plains and the Corn Belt, more than half of the land in the SMSA's was cropland, and in the Lake States, more than a third.

Farm production area. Agriculturally, the SMSA's play an important role. About 14 percent of the Nation's harvested cropland and 21 percent of all irrigated acreage is in SMSA's.

All of the major U.S. crops, measured in terms of total value of production, are important in SMSA's. In the mid-1960's the SMSA's produced about 16 percent of our wheat, 17 percent of our corn, about 60 percent of the vegetables sold, and 43 percent of the fruits and nuts.

Fruit and vegetable production tends to remain concentrated in urban areas even as cities expand. Farmers usually just move a little farther out. But in the case of corn, soybeans, wheat, cotton, tobacco, and hay, the relationship is largely competitive. These generally are produced in areas where soils and climate are most favorable, and where markets and transportation combine with production conditions to give them an economic advantage. As land producing these crops becomes urbanized, adjustments are made nationwide.

WETLANDS DEVELOPMENT. Wetlands—areas with poor drainage or frequent overflow from flooding streams—comprise a large land acreage in

the U.S. They take up about 265 million acres, or about 18 percent of rural non-Federal land.

Of this total, 100 million acres are used for crops, 61 million acres are considered unsuitable for cultivation, and 104 million acres are classified as potentially suitable for cultivation.

These 104 million acres are mainly in two broad regions in the more humid eastern half of the country. About half are in the coastal plains of the southern U.S. and 35 percent are mainly in the glaciated areas of the northern U.S.

Action areas. At present, the principal development of wetlands for agricultural purposes is found in the lower Mississippi Valley, South Florida, and scattered small-scale development in other regions and localities.

In the Mississippi Valley and South Florida, wetlands development differs in several respects.

The lower Mississippi Valley comprises an alluvial area averaging around 600 miles long and 65 miles wide and extending from southeast Missouri to southern Louisiana. Innumerable low ridges or natural levees retarding drainage were formed and then abandoned as the river channel migrated.

The area has a modern agricultural economy, based primarily on cotton and soybeans. Crops are produced on reclaimed wetland, a long-time activity that has accelerated in recent years. A recent study shows 4.1 million acres of forested wetlands were cleared and drained during 1950–69, mostly for soybeans.

Effect limited. Despite extensive clearing and drainage, environmental change in the Mississippi Valley appears to be limited to a reduction in total wetlands and associated biological resources. Even if development continues, substantial acreage will remain unreclaimable. Because of the local rather than interlocking nature of the drainage, agricultural development has little direct effect on much of the remaining undeveloped area.

In southern Florida, the situation is entirely different. The concentration of wetland development centers around Lake Okeechobee and involves some 10 million acres, including the basins of the Kissimmee River and smaller streams.

However, only about 6 million acres are subject to direct developmental pressures from either agricultural or nonagricultural uses.

Agricultural land developers in the Lake Okeechobee area are attracted by climate. The humid, near tropical conditions permit production of high value crops—particularly tomatoes, sweet corn, snap beans, and other vegetables for the winter market. Yields are not notably high.

Crop production depends on an extensive system of flood control and drainage installations constructed by the Army Corps of Engineers and operated by the State. The project is multipurpose, providing water control and supply for both agricultural and nonagricultural uses.

Projections are that from 1965 to 1985, the undeveloped wetland area of South Florida would be reduced by 30 percent, and a similar trend could continue beyond 1985.

Of the 6.3 million acres suited for agricultural development, it's projected about 400,000 will be used for cropland by 1985, 400,000 for improved pastures, and 400,000 may be absorbed by urbanization.

Serious impact. The impact of wetlands development in South Florida is particularly serious because the water supply of the entire overflow area, not merely the developed part, has been affected to some extent. The truly unique flora and fauna of the Everglades is dependent on periodic overflows from Lake Okeechobee. Both the quantity and time of overflow are important to maintaining the natural state, and this delicate balance has been modified by agricultural and nonagricultural development.

Complicating the problem of water supply is the problem of water quality. Chemicals and other pollutants enter the water supply from both ag-

ricultural operations and extensive urbanization.

ENERGY DEMANDS. Rural areas will be affected by a number of adjustments in energy production that are occurring or are in the offing. These include—

✓ overall expansion of the production of energy to meet the demand created by population increase and greater per capita consumption.

✓ changes in technology to minimize environmental impacts.

✓ shifts being made in types of fuel used: for example, the shift from oil to natural gas and low sulfur oil and coal in order to minimize air pollution.

✓ a substantial increase in the future use of coal, particularly that obtained by surface mining, because of constraints on the supply of oil and gas and problems with nuclear power.

✓ location of facilities for generating electricity from fossil and nuclear fuel away from congested areas.

This situation appears to have three major implications for rural areas.

More surface mining. First, surface mining of coal will increase. About 1.5 million acres of land have been disturbed by surface coal mining, and rates of exploitation are being stepped up. (If all the available reserve of 128 billion tons of strippable coal were to be recovered, as much as 45 million acres of land could be disturbed.)

Output per worker is about double that of underground mining, operating costs are 25–30 percent lower, and equipment is getting larger.

Heads west. Some 77 percent of the country's economically strippable reserves lie in 13 States west of the Mississippi. As utilities consume more low-sulfur coal, surface mining in the West could assume major proportions.

The next largest concentration of strippable coal is in an area encompassing the southern two-thirds of Illinois plus adjacent corners of Indiana and Kentucky. In 1964, this

region took the lead in strip coal production and has since been increasing that lead.

Northern Appalachia, which ranks third in strippable coal resources, was the largest producer till 1964, falling behind because much of the easily stripped coal has been mined and because the new equipment is better adapted to more even terrain.

In its virgin state, the U.S. had about 115 billion tons of coal lying within 100 feet of the surface. Less than 5 billion tons have been mined, with 110 billion left in 15 States that each have over 1 billion tons. Montana alone has 23 billion tons.

The second implication of the energy situation for rural areas is the trend of locating electricity generating facilities away from congested areas so that chemical and thermal electric pollution of air and water can be diffused.

By 1990, there are projected to be 492 large thermal generating plants—more than twice the number in 1968. Many of these larger facilities may require cooling ponds of 2,000 acres or more to aid in dissipating surplus heat.

The third implication is that location of large plants away from urban concentrations will mean more and probably larger transmission lines transecting the countryside. There currently are over 300,000 miles of overhead transmission lines passing over about 4 million acres of right-of-way. Prospects are that about 100,000 miles of new lines on 1.5 million acres of right-of-way will be constructed each decade for the balance of this century.

RECREATION'S IMPACT. Recreation involves one-fourth of the Nation's land and three-fourths of its population.

Population and income growth—as well as more leisure time—are certain to intensify the two issues already facing recreation interests: access to land and environmental protection.

Spending doubles. Americans doubled their outlay for recreation in the 1960's. Spending reached \$36 bil-

lion in 1969, or about \$179 per person. About a fourth of this was connected with outdoor recreation.

Land area available for or actually used for recreation probably exceeds 3 acres per person. However, more than half the total recreation land is in the Mountain States, and about a fourth is in the Pacific States.

Less than 10 percent of recreation acreage is located in urban areas, although over half of public recreation sites are in urban areas.

In the future. Federal, State, and local governments are expected to acquire additional land for recreation and wildlife use, including some farmland. Most of this land is mountainous or swampy and of limited use for agriculture. Also, many thousands of acres will be converted to recreation use by private developers and owners.

In addition, recreation use is often compatible with other uses. Further recreation development continues as a joint use of rural land in agriculture or forestry or in watershed protection areas.

Second homes. In some localized areas, development of land for recreation may compete for good agricultural land. But the conversion of cropland for either public or private recreation use has been considerably less than the voluntarily and publicly subsidized withdrawal of surplus cropland in recent years.

The demand for individual private recreation sites, including second homes, may have greater impact on rural areas in the long run than will the acquisition of land for either public or commercial recreation sites.

The withdrawal of forest land for recreation has been more significant than the withdrawal of cropland. In a large part, however, it has been balanced by a reversion of crop and pastureland into commercial forests.

While there is no overall shortage of rural land for recreation purposes, there is pressing need for more recreation lands directly accessible to urban populations. (13)

[Third in a series.]

It's a simple question with complex answers, an ERS study shows. Here are some of the facts about who controls our farmland, forests, and other natural resources.

WHO OWNS THE LAND?

No one knows precisely how many people own land in America.

Most of the Nation's 2.3 billion acres are in the hands of private landholders, either individuals or corporations. They own nearly three-fifths of the land.

Federal, State, and local governments own the rest, with an additional 50 million acres held in trust for Indian tribes and individuals.

This proportion of private to public land ownership has been remarkably stable for the past 50 years. The biggest change came in the 1950's when Alaska and Hawaii became States and increased Federal lands from about a fifth of the total U.S. land area to about a third.

By far, the biggest share of the Nation's land is in farms—slightly over 1 billion acres in 1969. Almost all of the cropland and most of the grazing land is owned privately.

Forest land ranks next, accounting for three-quarters of a billion acres in 1969. Well over half of the forest land is also in private ownership.

The rest—some 430 million acres—are sites for cities, transportation, recreation, wildlife, public facilities, farmsteads and farm roads, and swamp, mountain, and desert areas.

Farmland holders. While the Nation's farmland makes up the biggest proportion of the land, ownership is concentrated in the hands of an estimated 4 million people. And ERS estimates that about 1.4 million of these owners do not themselves operate any of the agricultural land they own.

In day-to-day operations decisions about the use of farmland are in the hands of the 2.7 million farm operators. Ninety-eight percent of all sales of farm products, however, are made by only 1.7 million op-

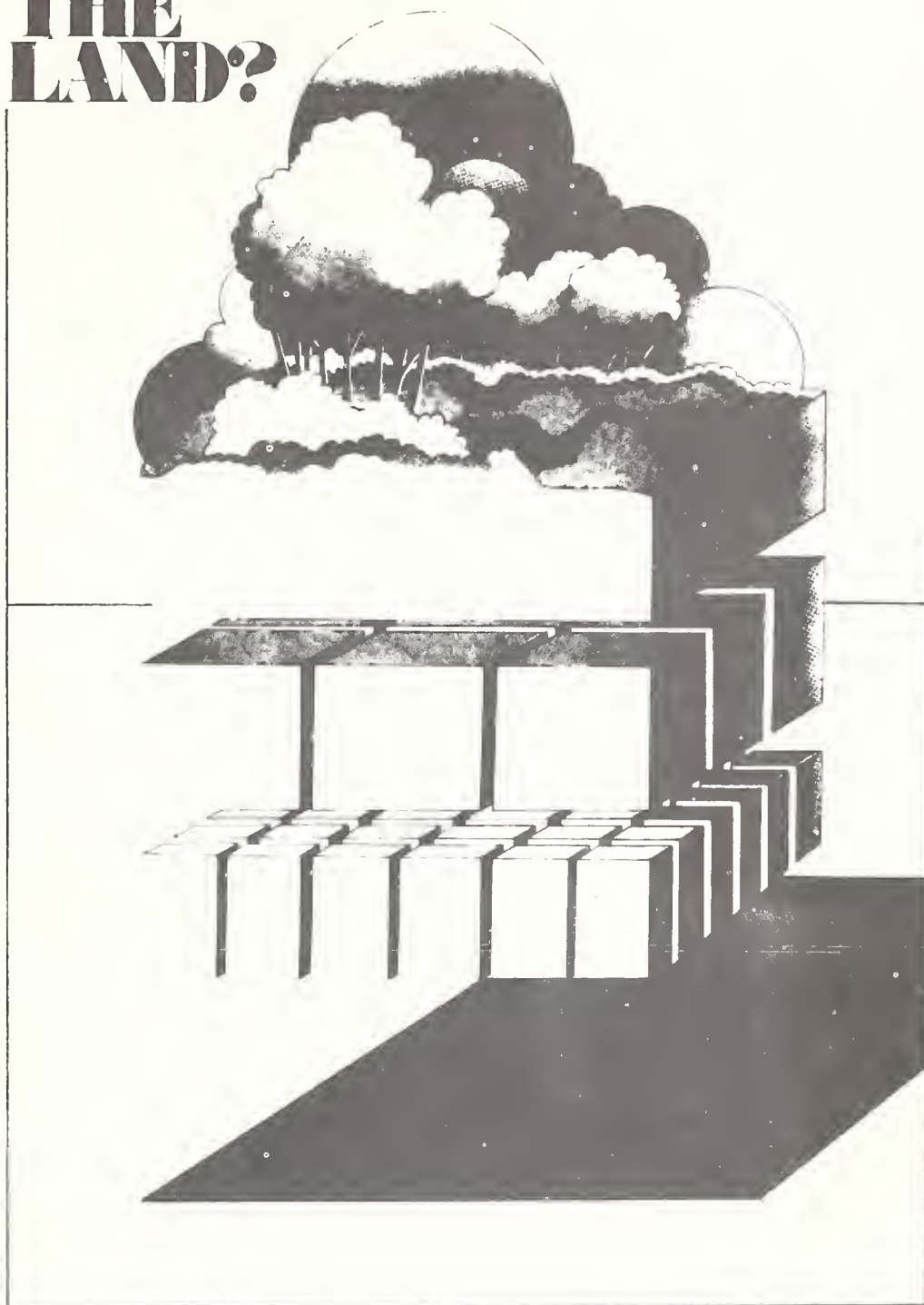
erators of farms with annual sales of \$2,500 or more.

About half of the land in farms is operated by part-owners . . . more than a third is operated by people who own all the land they farm . . . and about 13 percent, by tenants, who own none of the land

on which they farm.

In terms of ownership, farm operators owned about 68 percent of the farmland in 1969, or about 722 million acres.

However, they did not necessarily operate all the land they owned. For example, full owners held



nearly 413 million acres of farmland in 1969, but they operated only about 375 million acres. They rented the rest to either part-owners or tenants.

On the other hand, about 13,000 tenants reported that they owned some farmland—in total, about 4.5 million acres—which they rented out to other farm operators.

In addition, about 7.2 million acres of farmland is subleased by farm operators to other operators.

Why rent? The motives for leasing and subleasing land frequently relate to an operator's desire to put together an economic operating unit. For example, a farmer may decide to rent a larger or better farm—and thus be classified as a tenant—rather than operate just land that he owns. Many full-owners rent out part of the land they own in the process of reducing their farming operation as they approach semiretirement.

Of the total cropland—some 475 million acres, just about 99 percent is privately owned. Grassland pasture and range—over 600 million acres—are about 60 percent privately owned.

This total of some 1 billion acres has stayed just about the same for the past 30 years.

Forest land breakdown. Unlike cropland, a sizable chunk of the Nation's more than 750 million acres of forest is owned by the public. About 316 million acres are in the hands of Federal, State, and local governments.

Forest land has a number of major uses—including timber, recreation, water, and forage for domestic and wild animals.

But in classifying forest land, one major criterion is its productivity for wood growth.

The U.S. Forest Service classifies forest land as "commercial" if it is capable of producing 20 cubic feet of usable wood per acre each year.

By this classification, nearly 70 percent of the Nation's forest lands are "commercial." Some of this is reserved for parks and wilderness

areas, but there are about 500 million acres that could contribute to our wood needs.

Nearly 3 out of 4 acres of this commercial forest land are privately owned. Most of this privately owned land—88 percent—is east of the Great Plains.

"Commercial" ownership. The forest industry owns nearly 14 percent of the commercial forest land and public lands account for another 27 percent. But small, private owners account for the greatest bulk of the Nation's commercial forest land. They hold 60 percent of it.

In the two most productive regions, the South and the Pacific, the forest industry owns about 18 percent of the land. Private owners with small tracts—usually under 60 acres—hold more than 70 percent of the forest land in the South and 20 percent in the Pacific region.

In the East as a whole, small owners hold more than 70 percent of the commercial forest land.

Insofar as the potential problems of forest land use can be identified with ownership, it appears that increased wood production in the East will depend heavily on the management decisions of small tract owners.

In the western regions, management decisions will be dominated by the public owners together with industrial owners in the Pacific States.

ERS notes that from 1950 to 1970, small, nonoperating owners—and to a lesser extent, the forest industry—have expanded their acreage. During the same period, the acreage of forest land on farms declined.

Federal landholdings. Of all the public landholders, the Federal Government is by far the biggest.

It owns 1 in 3 acres in the U.S. for a total of 762 million acres.

The land is diverse—from the tropical soils and vegetation of Hawaii and Florida to the tundra of Alaska.

All told, some 37 Federal agencies administer these lands. Two

agencies—the Bureau of Land Management and the Forest Service—administer 87 percent of Federal lands. Other Federal agencies that administer large acreages of public land include the Department of Defense, the National Park Service, and the Bureau of Sport Fisheries and Wildlife.

Most of the Federal lands are in 11 Western States. And in those States where the Federal Government is a principal landowner, the management and use of the land significantly affect State and local economies.

Federal lands produce a wide range of products, including timber, forage, and minerals, and they have an abundance of resources, such as water, fish and wildlife, and outdoor recreation sites.

Nearly 100 million acres of Federal land are classified as commercial forest and are managed to maintain a sustained yield of wood products. This area represents about 20 percent of the Nation's commercial forest land. Nearly 40 percent of the Nation's supply of marketable timber and more than 60 percent of its softwood sawtimber are on land owned by the Federal Government.

Big bite. Livestock grazing is the most widespread use of Federal lands, with well over 1 in 3 acres used for this purpose. Although Federal lands account for only about 3 percent of the total forage consumed by livestock in the U.S., they provide at least seasonal grazing for more than 4 million cattle and 9 million sheep.

In some States and local areas, Federal lands are especially important. In Nevada, Federal lands provide about 45 percent of the total feed requirements for beef cattle and sheep, and in Utah, 30 percent.

Minerals on Federal lands also constitute a resource of great national importance. In 1968, 6 percent of the Nation's oil production came from Federal lands. Some 64 million acres were under lease for oil and gas. More than 8,200 pro-

ducing mineral leases generated royalties to the Federal Government of more than \$92 million.

Much of the national production of copper, nickel, silver, lead, molybdenum, potash, and mercury comes from Federal land.

The Federal Government may also be considered the Nation's principal supplier of outdoor recreation facilities.

It owns more than 33 million acres that are truly unique in terms of scenic or natural attributes, in-

cluding national parks, monuments, scenic and wild rivers, wilderness areas, and seashores.

Federal lands provide not only habitat for much of the fish and wildlife in the country, but also access to fishing and hunting. Some 17 million acres are set aside for resident game species, and 9 million acres are set aside as migratory bird refuges. Of particular importance is the dependence of big game for habitat on Federal lands.

Federal lands are the principal

source of water for many of the arid areas of the West. They provide about 61 percent of the natural runoff in the 11 conterminous Western States, with the bulk of the runoff coming from land administered by the Forest Service.

Altogether, much of Federal land is used for several purposes. Thus, acreages given here for specific uses don't necessarily add up to the total acreage for land controlled by the Federal Government. (1)

[Fourth in a series.]

WHO OWNS OUR WATER?

Water "ownership"—or water rights—is a whole new ball game compared to land ownership.

The country tends to be divided down the middle on State water rights laws, which generally decide who owns what. And, climate heavily influences our water rights laws.

In the humid East, water rights generally go to the person whose property adjoins the stream in question. This stems from the doctrine of riparian rights, riparian referring to the bank of a stream. The doctrine was readily adapted to the East by early settlers, who found the water supply much like that of their native England.

However, in the more arid West, preferred water rights generally go to those who tap the stream, regardless of whether or not their property adjoins the stream. This, the "prior appropriation doctrine," opened the way for extensive irrigation development.

In the hot and arid West, rain usually doesn't come when it's most needed by agriculture. Thus, irrigation generally is a necessity to raise crops and is taken into consideration in the case of water rights.

The two doctrines are the basis for most of the water rights laws regarding watercourses in the country. The riparian doctrine exists in the 31 States lying east of Texas and the Dakotas. This is subject to permit requirements in some States and to public rights in navigable waters. It also exists along with the appropriation doctrine in some Western States. The appropriation doctrine exists in most of the 19 Western States and in some degree in some Eastern States.

There also are various State water-rights laws regarding ground waters and diffused surface waters.

Federal and local governments also exercise some control over water resources that may affect water rights. Federal areas of concern may include navigation, flood control, irrigation, hydroelectric power, water supply, watershed protection, fish and wildlife preservation, recreation, and water quality. Local government regulations prevail in some areas where States have delegated the authority to the local level. (2)

*Out West, water rights
are one of the
prime determinants
of land value.*



TARGET:

THE WISE USE OF OUR LAND



Of growing national concern is the issue of how we can control development of private lands. Just what controls do we have? ERS reports here some powers the public has over private use of land.

What's stopping some of our best farmland from being chopped up into subdivisions?

Or a quiet village from being overpowered by sudden, "unstoppable" development?

Or a recreation spot, unique for its wildlife, from being developed till it loses its main attraction?

In essence—what control does the public have over private land use? In a study on land and water resources, ERS looks at this question. It concludes that there is an almost limitless variety of tools or devices available to governments to control land use. The more general problem is that they are not being used. This is particularly true in rural areas.

The ERS study notes further that those local governments using the tools do not in general devote suffi-

cient resources to make them effective.

Control by the general public can take many forms—including special purpose districts, but most of the power is in the hands of Federal, State, and local general purpose governments.

The Federal Government has the immense power to tax and spend; the State governments have a lesser power in this area but they have broad regulatory power; and local governments have a more limited power to tax and regulate but the unique power to hear and express the views of individual citizens through such means as council meetings and public hearings.

Main regulator. Traditionally, it is the local government that regulates land use, with the State governments having delegated this authority.

The main means have been through zoning ordinances and subdivision regulations. Building, housing, and health codes are also widely used, but are more limited in scope.

For rural land use, it may be the

county government that has the greatest control or the town or township, depending upon whom the State authorizes. This varies widely among the States.

On the books. Zoning of unincorporated or rural areas is authorized in all 50 States covering land in more than three-fourths of the 3,000 counties in the U.S.

However, local governments usually have the option of either adopting or not adopting land use regulations.

In general rural areas are far more deficient in the field of land use planning and regulation than urban areas. They're less likely to have a planning board, less likely to have a full-time planner, and they spend only about a third of what urban areas do per person for planning and regulating land use in their community.

Yet many of these rural areas are where the action is in terms of growth and they're the least able to cope with it.

Sometimes they lack the legisla-

tion. But often, they simply lack effective enforcement.

An example:

A small town in Vermont had the "misfortune" to be near good ski slopes. It suddenly became one of the biggest growth sites in the State—lots were sold and resold, nightclubs proliferated, a huge condominium went up.

Out of control. And the town of fewer than 2,000 permanent residents couldn't keep up with the services required even after taxes were doubled. The new sewage treatment plant became inadequate with the new building boom . . . police costs soared . . . and traffic jammed for miles through the town on winter weekends.

Vermont has one of the most stringent land use laws in the country. Local officials, however, say the State doesn't provide enough funds to communities for land use planning, zoning, and enforcement to make the laws effective.

The National Commission on Urban Problems reported that a sample survey taken in 1967 showed Standard Metropolitan Statistical Areas (SMSA's) spent three times more per person for planning, zoning, and building regulation activities than did non-SMSA's—essentially rural areas.

In addition to budgeting more money for land use planning and regulation, many communities need to take up the option on controls already available to them.

Take for instance the case of a predominantly agricultural county in California that couldn't put a stop to land speculation until much of its ranchland had been subdivided. Developers put in roads and mass-advertised the acre lots as vacation and second home sites.

Brought to halt. It took several years, and some trial and error, before the county found effective regulation in the form of zoning to stop the essentially speculative subdivisions.

But, as one official said, "If you take a 1,000-acre ranch and divide it

up into roughly 900 one-acre lots, with the remaining acreage in roads, you have ruined the ranch. A ranch with 900 owners can never be reassembled."

That county wound up with 17,000 acres of vacant lots.

With the county's current zoning, developers who want to change land zoned agricultural to residential have to request a variance from the planning office. And it's granted only if the developer can present a good argument why it should be done—plus show an attractive plan for development.

So far, most of the requests for rezoning variances in the county have been for expansion of an existing community. And development in these areas usually causes no severe drain on such county services as police and fire protection and schools.

Just how many local governments actually exercise their authority to regulate land use is not known. National statistics aren't regularly or systematically collected.

But from the 1967 survey by the National Commission on Urban Problems, it's apparent that rural local governments lag considerably behind urban areas.

The survey showed only 48 percent of the counties outside SMSA's had a planning board . . . compared with

80 percent of the counties in SMSA's.

In addition, 70 percent of the employees for planning and regulating land use worked part-time in areas outside SMSA's compared with only 28 percent inside SMSA's. For all jurisdictions attempting to regulate land use, fewer than 1 in 4 had any full-time employees.

On Capitol Hill. The President has recommended and the Congress is now considering legislation to establish a national land use policy. Legislation that is proposed would provide grants to States to assist them in improving their land use planning processes.

Most decisions would still be made at the local level in rural areas. The States would, however, be involved in decisions of more than local concern—such as environmental and regional matters.

In the decade ahead, the need to plan and regulate land use will increase as greater emphasis is placed on maintaining environmental quality standards. Practically all pollution problems have a land use dimension.

This will take greater coordination and integration of the powers available to the different levels of government in our Federal system. (1)

[Last in a series]

LOCAL GOVERNMENTS . . . AND THEIR ACTIVITY IN PLANNING, ZONING, AND BUILDING REGULATION¹

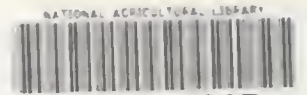
	Number of local governments	Planning board	Percent with Zoning ordinance	Subdivision regulation	Per capita expenditure ² (Dollars)
County governments					
Within SMSA's ³	404	80	49	63	0.54
Outside SMSA's	2,645	48	19	24	0.28
Municipalities					
Within SMSA's	4,977	68	75	61	2.19
Outside SMSA's	5,007	66	63	45	1.08
New England- type townships					
Within SMSA's	2,228	57	57	54	1.04
Outside SMSA's	2,732	43	27	25	0.65
Total governments					
Within SMSA's	7,609	65	68	59	2.16
Outside SMSA's	10,384	55	42	34	0.70

¹ Based on data from a 1968 report of the National Commission on Urban Problems. ² Based on 1960 population totals. ³ Standard Metropolitan Statistical Area—an entire area in or around a city or community of 50,000 or more people and where activities form an integrated economic and social system.

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